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Canine Nutrition*

J. J. DAVIES, M.R.C.V.S.,
WEST HAM

It is probably true to say that there has been more ignorance displayed by owners in the feeding of their dogs than in connection with the feeding of any other species of domestic animal.

This state of ignorance is not confined to the pet owner entirely, but is found quite commonly amongst breeders and trainers. It is difficult to explain fully how this ignorance has arisen. Undoubtedly one contributory factor is the extensive advertisement of dog foods in our daily Press and canine periodicals. The advertisement of these foods has been so well done that owners have become convinced that their animals cannot possibly survive unless they adhere faithfully to the diet charts issued by the food advertiser. There has arisen the general belief that the basic foods of milk and particularly meat are something in the nature of a poison to a dog. Among other beliefs, one frequently hears that meat causes distemper, is responsible for worms or makes the dog ferocious. Indeed, the ordinary owner requires a lot of advice on the correct dieting of the pup, and the maintenance of the full-grown dog in a state of healthy nutrition.

What is meant by nutrition? Sir George Newman (quoted by Burnet and AyKroyd), referring to human nutrition, connects the term nutrition with the total well-being and right functioning of the whole body. Height, weight, substance, colour, elasticity, balance and carriage of body, the effective functioning of the nervous system, heart, lungs and alimentary tract, the readiness and relative strength of the muscular system—all these he implies must be taken into account in judging the individual's state of nutrition. Though our dogs vary in wide extremes of breeds and types, their state of nutrition can be judged on the same standard. The aim in the managing of the dog is the breeding of a physically fit animal and maintaining it in a perfect state of nutrition, or what is commonly termed "condition." Condition can only be maintained by proper nutrition and suitable exercise or work. The pet dog is expected to be a cheerful companion and should provide some liveliness in the home, whilst the working dog should accomplish its work with pleasure and without undue fatigue. The general fault with owners is to keep their animals too fat, and indeed it is a miserable sight to see on our streets dogs supposed to be having exercise having to be dragged along on the end of a lead.

First and foremost it must be realised that the dog is a carnivore. Its whole anatomy and physiology has been developed for the consumption and assimilation of animal foods. The whole length of the alimentary tract has been modelled for this. The stomach is comparatively large, capable of holding 6 to 7 pints in a medium breed of dog, the small intestine is short, being only about 13 ft. long, while the colon only measures 2 to 2½ ft. That important organ—the liver—is extremely well developed and accounts for 3 per cent. of the dog's body weight. The kidneys, too, are relatively large, being 1/150 of body weight.

The significance of this arrangement is that a considerable meal can be accommodated in the stomach; one meal a day suffices for most dogs. But owing to the limited capacity of the intestines, there is very little room for roughage; hence the meal must be of concentrated foods.

The 0·4 per cent. HCl gastric juice is able to extract mineral matter from bones, whilst the relatively enormous liver and kidneys can deal very efficiently with the products of protein digestion.

As with all species of animals, particular attention must be devoted to the nutrition of the puppy. If, in infancy, the pup is withheld the correct and suitable food factors, its physique and health is impaired for its whole lifetime. The pup grows rapidly and rapid growth demands protein and protective foods, otherwise essential organs will be badly constructed and the damage done is irreparable. Liver, kidneys and heart are very important organs in the dog, and unless the pup is properly nourished these organs will be "damaged goods," and unable to deal efficiently with a flesh diet. Further, under-developed organs become, late in life, easy prey for diseased conditions. It is therefore reasonable to assume that the frequency of diseased conditions in liver and kidneys, found in middle-aged dogs, can be partly attributed to the incorrect nutrition of the pup.

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FOOD FACTORS

Every animal needs to be supplied daily with a certain quantity of food. The food must contain protein, fat and carbohydrate, along with minerals and vitamins.

Protein is one of the most important constituents in the dog's diet. It is worthy of special note that bitch's milk contains 11 per cent. protein to provide for the rapid growth of the pup. The greater part, if not the whole of the protein supplied must be of animal origin. This is easily and well digested and assimilated. Such protein is contained in meat, milk, eggs and liver. Dogs are unable to make full use of vegetable protein such as is found in peas, beans and soya beans. In war-time dogs have to derive practically all their protein supply from condemned and knacker meat.

Fat serves a useful source of energy. It renders foods more palatable and acts as a vehicle for fat soluble vitamins. Bitch's milk contains nearly 10 per cent. fat. The dog can deal satisfactorily with a reasonable amount of fat in its diet and it is a mistake to withhold all fat. Many greyhound trainers go so far as to cook all the meat to extract the fat, which is then discarded, and foolishly include enormous quantities of bread in the diet. Excess fat of course will cause indigestion, but as a rule there is no excessive amount in the type of meat fed to dogs.

Carbohydrate in the dog's diet is invariably supplied in the form of bread, dog biscuit or meal. The fault with most canine diets is that they contain excessive amounts of carbohydrate; nevertheless, after the body requirements for protein have been satisfied, it is logical and economical to supply carbohydrate for energy requirements, this being always relatively cheaper than protein for the production of energy; 1 lb. of beef produces 1,100 calories, whilst 1 lb. of brown bread produces 1,000. Besides supplying energy carbohydrate assists in the metabolism of fats—"fats burn in the fire of carbohydrate." The diet of the pup must be low in carbohydrate because a diet rich in cereals is poor in available phosphorus which intensifies rickets, particularly in the absence of vitamin D.

Minerals are indispensable but the quantities required are relatively small. The most important minerals are calcium, phosphorus and iron. Minerals are rich and most easily supplied in milk, soft bones, blood and bone meals, and to a less extent in meat. Calcium and phosphorus metabolism demands special attention in the dog, particularly in connection with rickets. The recommended calcium phosphorus ratio is 1:1 in adults, whereas the milk of various animals indicates that 3:1 and 2:1 is optimum for periods of rapid growth. Milk, therefore, besides supplying the food factors, is a convenient source of minerals in their proper proportion.

There remains one complex group of food accessories—the vitamins. Vitamins are necessary for growth, health and even for life itself. Though a great deal of work has been done and published regarding the rôle of vitamins in nutrition, there still remains a good deal of mystery attached to them. One rarely finds in practice the clear-cut picture obtained by feeding a dog on a particular vitamin-free diet.

The fat soluble vitamins A and D found in summer cow's milk, eggs, liver, fish and cod liver oil, are undoubtedly important in the development of the pup, whereas the full-grown animal appears to survive comfortably if allowed a suitable diet, good hygienic conditions and the full benefit of the sun's rays. It is reasonable to assume that the dog is capable of storing enough vitamin D derived from summer assimilation to last over the winter period.

The vitamin B complex is found in the germ of cereals, liver, raw meat and blood. Dogs receiving a suitable meat diet exhibit no deficiency of this vitamin, but if the meat is cooked excessively or given in the form of canned meat, there is the danger that the vitamin is destroyed and lost. As much as possible of the meat fraction of the diet should be fed raw.

It is generally accepted that the dog is capable of synthesizing vitamin C. It is possible, of course, that this mechanism may break down and symptoms of vitamin C deficiency develop.

DIETING

Dogs are natural scavengers, and it is surprising how the small cross-bred survives and apparently enjoys good health by being only

allowed scraps left over from the family table. Under war-time conditions the choice of foods is very limited. Milk and bread are forbidden as foods for the dog. Knacker and condemned meat is allowed as well as the limited supply of prepared dog biscuit foods. Though potatoes are generally considered harmful for the dog, they could in the present emergency be included in the diet to replace carbohydrate normally supplied in bread and biscuit foods. Potatoes supply vitamins B and C and more calcium and phosphorus than cereals, but they must be well cooked and mashed, to ensure complete digestion. It is unnecessary to include vegetables in a dog's diet. Unless they are minced and incorporated in a mash the dog invariably refuses to eat them. The benefit of vegetables to man is in supplying vitamin C, which is unnecessary in the dog, as it is capable of synthesizing its own vitamin C.

I shall not attempt to outline suitable dietary charts to cover the whole range of types and breeds, but I will describe a war-time diet for a greyhound that has proved very satisfactory at a greyhound kennel with which I am associated. The diet is very simple. The only foods allowed are knacker and condemned meat, bones and biscuit food. The daily allowance per head is 1 lb. meat and ¾ lb. biscuit. In a mixed kennel of greyhounds this means that the bigger dogs weighing 60 to 70 lb. receive roughly 1¼ lb. meat and 1 lb. biscuit daily, whilst the bitches weighing 50 lb. will be getting roughly ¾ lb. meat and ½ lb. biscuit. The bones are used to prepare soup and all the fat derived from bones and meat is fed. As a rule the available meat contains only moderate fat. About half the quantity of meat is fed in the raw state.

This diet is capable of producing roughly 1,750 calories daily. Man, doing light work, requires approximately 3,000 calories daily.

These greyhounds are given moderate exercise every day and race over the distance of 460 or 525 yards once or twice weekly.

This kennel of greyhounds has been kept on this strict and unvaried diet for close on 12 months, and during this period the dogs have maintained extremely good health despite a severe winter, their body weights have kept consistent and, what is more important, the animals have kept in good physical condition. It cannot be stressed too frequently that what must be aimed at in canine management is the maintenance of "condition" and fitness.

A further blessing that has accrued from this diet is that the dogs have been practically free from skin disease. I am unable to decide what factor in the diet has been responsible for the healthier skins, whether it is the rich protein diet or the inclusion of fats. However, this present diet has given far better results than the pre-war diet which consisted of ½ pint milk, ½ lb. meat and 1 lb. bread daily, plus vegetables. This latter diet again supplies approximately 1,750 calories.

For a short period the daily allowance of meat was reduced to ¾ lb. but it was found to be insufficient and the dogs rapidly lost weight and condition. On their present diet of 1 lb. meat and ¾ lb. biscuit, the dogs are in good moderate condition. To raise the standard of condition to excellent, it would be necessary to allow at least 1¼ lbs. meat daily. Their present diet, therefore, is the minimum.

War-time diets for the other breeds could be calculated on this greyhound standard. For instance, a 20-lb. terrier receiving moderate exercise would require one-third of the greyhound allowance, *i.e.*, 5 to 6 oz. meat and 4 oz. biscuit.

Conclusions

It would appear that dogs at all ages require a rich protein diet. This protein can only be supplied, particularly in war-time, in the form of meat. The rapid growth of the puppy demands a diet rich in meat as well as minerals and vitamins. It is unwise, and one might say unpatriotic, to attempt the breeding of the bigger breeds in war-time. If an effort is made it should be arranged that the pups are whelped in early spring. In this way they reap the full benefit of summer sunshine at a critical age, and thus avoid the tendency to develop rickets.

At all times, aim at keeping the dog, whatever its type or breed, in condition. This can only be accomplished by proper nutrition.

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Discussion

Mr. S. F. J. Hodgman said that although he had been asked to assist in the opening of the discussion on Mr. Davies's paper, he wished to make it clear that he did not claim to be an authority on canine nutrition, his knowledge of the subject being general rather than particular.

The subject was so vast that he could only touch, and that in rather a general way, on some of the points that interested him most in Mr. Davies's paper.

The writer seemed to have confined his remarks chiefly to the nutrition of the racing greyhound, and expected them to assume that all dogs should be fed in a similar manner. This Mr. Hodgman believed to be wrong, since one dog's meat was too often another's poison. A dog brought up and keeping fit on one combination of food would resist all coaxing with a different diet upon which another dog was being fed with perfect success.

Animal bodies, canine as well as human, would stand gross ill-treatment in the way of feeding over a considerable period, and eventually would manage to adapt their physiological actions to the conditions imposed upon them. Although dogs were still considered carnivorous, they could be kept in perfect health on a diet in which the protein supplied was non-mammalian, such as fish and the proteins contained in cereals. Whether the dogs so fed were happier was a moot point but, after all, a wild dog when food was plentiful, having killed, would gorge itself to capacity, sleep off its meal for a day or two and, after the necessary unloadings, would clean itself up and go a-hunting again. These habits in their animals would scarcely suit greyhound owners or sheep farmers, hence the adaptation of canine diet to conditions of domestication.

Once a dog had accustomed itself to a complete diet it should remain healthy, saving the diseases to which canine flesh was heir.

Worm infestation could affect the general health, and the widespread belief that worms were contracted from eating raw meat was true in so far as some tapeworms were concerned.

Dogs could swallow almost anything and often, if it did not agree with them, up it came. There was food value in most diets given to house dogs, and if more calories were assimilated than were expended in digestion the animal would benefit; the converse was also true. It was an amusing speculation whether a diet could be worked out for, say, a cocker spaniel, so that it would lose weight the more it ate.

So long as the fundamentals were provided for assimilation, did it really matter what form they took? A dog could digest starchy cereals and so get sugar and protein. All plants contained the helping elements in the form of salts, so did it make a material difference whether a dog got its protein, carbohydrates, fats, minerals and vitamins direct from cereals or secondhand from meat? It was what was absorbed that mattered.

With the house dog the owner had a claim to consideration. He, or she, kept the animal as a pet or companion and not as a factory for the production of poison gas: there was a very grave objection to the flatus produced by some dogs when fed entirely on raw meat. Another ground for offence was the distinctive smell from their coats which might appear dry but were greasy to the touch. In some cases another unfortunate by-product of the too-meaty diet was an increase of sexual inclination which, on occasion, could be most embarrassing.

Although dog biscuits were on the market for years after the last war, they became of primary importance to millers, many of whom were left with expensive plants, built to produce biscuits for the Forces, lying idle on their hands. At about this time the enormous increase in dog-breeding presented them with a heaven-sent opportunity and, of course, they seized it. Personally, he thought that the judicious use of a good dog biscuit formed a sound component part of every-day diet but, as Mr. Davies had suggested, there were biscuits on the market that at least lay under grave suspicion of causing disorders never met with or, at any rate, never noted, before these unfortunate products appeared there.

Frankly, he did not believe there could be any hard-and-fast rule laid down for the feeding of dogs. The requirements of a sheep dog covering 20 to 25 miles in a day must be different from those of a pet dog, even if the two animals were of identical weight and size: and yet many sheep dogs remained healthy and vigorous on a diet of porridge and milk.

In normal times the average house dog did well upon one good meal a day consisting of a sound dog biscuit and household scraps, with plenty of drinking water. The exceptions were taken to practitioners whose job it was to find out, often through trial and error, a suitable diet.

He agreed with Mr. Davies' opinion of the extraordinary public ignorance on the feeding of dogs, but it was an undeniable fact that about four million dogs yearly were licenced before the war and almost certainly another million were kept outside the law, yet how small a minority were brought to veterinary surgeons for illnesses due entirely to nutritional troubles. Even greyhounds, whose diet was often little more than swill, contrived to thrive in a great many cases.

There were one or two queries he should like to raise upon Mr. Davies' statements. He had said that the HCl in the stomach was able to extract mineral matter from bones. Was it not the presence of the acid that helped the pepsin to digest protein? In passing, he could not but refer to the curious superstition that acid was placed in a dog's stomach to digest bones—things that the wild dog had never been known to swallow even when food was scarce. On the question of storing vitamin D during the summer to last through the winter, was this really possible? And what action had the sun on the dog, and how?

In concluding, he desired to thank Mr. Davies for coming there that day and reading them his very interesting paper. He hoped, too, that his own few remarks, if not greatly adding to the sum total of their knowledge, would achieve his main object in helping to provoke discussion.

Mr. W. R. Muir, of the Department of Hygiene, Royal Veterinary College, who was the second opener of the discussion, said that, in recent years, our knowledge of canine nutrition from the laboratory standpoint had very greatly increased and, in particular, we had come to know far more about the vitamin requirements of the dog. Most of this information had been acquired during fundamental studies designed to throw light on human nutrition and had not been ascertained specifically from the point of view of the nutrition of the dog itself. However, deliberate steps were now being taken to co-ordinate the available information and to fill in the many gaps that existed. The laboratory worker was therefore hardly in a position yet to rationalise methods of dog feeding. For this reason, he thought it a great pity that the knowledge possessed by the many successful feeders of dogs was not more widely distributed. The essayist had given them one example of a successful diet and he hoped that others would be ready to come forward and describe the diets which they, too, had found successful. This information would be of interest and value to laboratory workers as well as to dog owners.

He recalled that Professor Linton, whom they regarded as their authority on canine nutrition, had published tables giving the energy requirements of dogs under varying degrees of activity and that Professor Linton had also recorded observations on the ingredients and proximate chemical composition of diets which had been successfully employed in dog feeding.

As a result of the well-known experimental work of Sir Edward Mellanby and Mrs. M. Mellanby, we possessed detailed information of the vital role played by vitamins A and D in the development and structure of the bones and teeth of dogs. He thought that certain effects of vitamin A deficiency were of especial interest. In puppies, a dietary deficiency of vitamin A led to overgrowth of bone in various parts of the skeleton whereby pressure might be exerted on neighbouring

cranial or peripheral nerves with subsequent degeneration of these nerves. For example, deafness might occur in puppies as a result of these processes of bone overgrowth and nerve degeneration. In the absence of vitamin A, the gingival epithelium also became hyperplastic and less resistant to bacterial invasion with consequently an increased tendency to pyorrhoea.

The rest of our scientific knowledge was largely due to workers in other countries, particularly in U.S.A. We now knew that the dog required vitamins A, D, E and K (essential for the maintenance of normal blood clotting time), vitamin B_1, and about eight members of the vitamin B_2 complex, among which factors the chemical identities of at least five were known, viz.: riboflavin, nicotinic acid, pantothenic acid, pyridoxine and choline. Some effects of a dietary deficiency of any one of these vitamins were known. Those present at the meeting were probably already informed as to the effects of nicotinic acid deficiency in the dog and he thought it was possible that the deficiency effects of the other B_2 vitamins would also be of clinical interest. From the standpoint of ordinary feeding, we did not possess sufficient information concerning the distribution of vitamins in foods and of the quantitative requirements of dogs to enable specific recommendations to be made.

The great variety of breeds of dogs presented a special problem because it seemed that a dietary level of vitamins and minerals which was satisfactory for the small breeds of dogs was not necessarily satisfactory for the large breeds. Thus it was known that St. Bernards and Great Danes required a concentration of vitamin D in their diets at least ten times that of small breeds such as fox terriers.

He ventured to wonder whether a partial deficiency of vitamin B—might be related to the occurrence of cramp in greyhounds. We knew that vitamin B_1 was intimately concerned in the metabolism of glucose and lactic acid in the animal's body and we knew also that the requirement for vitamin B_1 increased significantly with exercise. It was conceivable that a particular greyhound diet might be adequate for maintenance and a moderate degree of activity but, nevertheless, it might still lack sufficient vitamin B_1 to support severe exercise.

Discussing points raised in Mr. Davies' essay, he stated that he was very glad to hear the essayist stress the importance of the nutrition of the pup. Few people realised that this was a vital factor determining the constitution and performance of the adult dog: at least, few people realised the desirability of maintaining the nutrition of the pup at an optimum level. Mr. Davies had mentioned the prejudice of some dog feeders against the use of milk and meat as the sole or main constituents of dog rations. In general, no single food could alone meet all the requirements for adequate nutrition. Milk was deficient in iron, copper, manganese and cobalt and was able to maintain health and growth in the suckling animal only because animals were born with a store of these "trace" elements which normally satisfied requirements until weaning time. In the diet of the adult dog, milk was not only a bulky food but it must also be supplemented with foods containing adequate amounts of the "trace" elements. Lean muscle meat was deficient in calcium and vitamin A and, bearing this in mind, he did not think we should lightly dismiss the claim that a diet of meat alone led to distemper, although the immediate causative agent was certainly not a dietary deficiency. However, would not a deficient diet tend to increase susceptibility to the distemper virus? The claims of practical feeders were usually based on repeated observations, and he believed that such observations should not be ignored because they happened to be reported with wrong interpretations. He would now leave others to discuss the many interesting points in the essay.

Major W. H. KIRK said that Mr. Davies' paper was one on a subject which was highly important not only to people connected with greyhounds, but to everyone engaged in canine practice. If there was one question that was asked more often than any other it was "Upon what should I feed my dog?" followed by "How much shall I give it?" His own answer to the latter question was to advise the owner to give a ¼ oz. of food per lb. body weight, of which ration two-thirds should be meat and one-third biscuit. If they did that their animals were rarely likely to fall ill from the nutritional point of view. He also told the owners to steer clear of the fibrous vegetables such as cabbage and that cooked spinach, carrots or onion was permissible. If one went to the greyhound kennels, one never saw any dry food being given: the dogs were always fed on pap. Moreover, he had observed that the greyhounds were never allowed water to drink, they were given a swill of brown bread, biscuit, vegetable and some meat. The greyhounds wolfed it and they raced well on it. He did not know what was undesirable about allowing drinking water, but he did know that in order to keep an animal ncurished it must have water *ad lib.* When he was in Tangier he wondered what was the reason for the emaciation to be seen in the animals—mules and dogs particularly—and he considered at first that it was lack of food, but, in the course of conversation, it became clear that this emaciation was due largely to lack of water. Water was good for the kidneys and the general health in every way.

Going back to the question of feeding greyhounds on swill, it was obvious to all who had experience of these animals that they suffered badly from pyorrhoea, and he put that down to the fact that they got nothing hard to chew.

Under present circumstances, he might be allowed to interpolate here that the cat was a difficult animal to feed to-day, but if they could get a cod's head and boil the flesh away from the bones, remove the latter, and allow the stirred-up remainder to set to a jelly, this would be highly appreciated by the cat and was most nutritious.

How could the essayist reconcile the fact that some people found that meat alone was a perfect food, and others that they never gave anything but biscuit—and again all was well?

In regard to vitamin B_2, he understood that the absence of it was responsible for the production of a disease which was hardly distinguishable from Stuttgart, and in many ways acute Stuttgart disease was scarcely to be differentiated from the disease they called haemorrhagic gastro-enteritis: it was a question whether vitamin B_2 would not be a very good thing to give in the latter disease. When a dog was suffering from anorexia, resulting from avitaminosis, if one smeared rhizamin on its teeth it would pick up at once. Rhizamin contained B_2, and that bore out what Mr. Muir had said.

Mr. G. C. KNIGHT expressed surprise that the question of bones did not receive greater prominence. There seemed to be two schools of thought on the value or otherwise of cooked bones for animals; his personal view had been, in spite of the teaching of Professor Wright, that bones did cause considerable trouble in dogs. He found from time to time that in those cases of vomiting in dogs, sometimes accompanied with great thirst, there was often a definite history of the animal, two or three days before the onset of the attack, having been fed on cooked bones.

Another point was the feeding of table scraps, on which Mr. Davies had said that dogs should be fed. He disagreed with that, particularly the feeding of such things as cake. He could cite quite a number of cases where dogs had been fed consistently on table scraps—in fact, whose whole diet was more or less that of a human being: his experience was that these animals died of nephritis at an early age.

With regard to the greyhound, it had been his good fortune to be able to watch a greyhound fed over a period of two years on a liberal supply of biscuit, but a minimum of meat and that was cooked. This animal had little exercise. Personally, he had never seen a greyhound in better condition.

In regard to rickets, did not the essayist think that quite a number of the larger breeds were much more disposed to rickets than others and also that, no matter what one did, one would not overcome it: in other words, that there was some hereditary disposition to the disease? He had been connected with a zoological gardens and he believed it was practically impossible to breed leopards in this country; most of them died at the age of seven months. They had their vitamins and everything else, but they all died with what he should have said was osteoporosis. In his opinion, in spite of all that these animals were given, that was due to the fact that they lived on wooden floors and their meals were invariably mixed up with grit.

With regard to vitamin C, he wondered if anyone could say, in the absence of vitamin C requirements on the part of the dog, why it was that one so often saw the dog eating grass and, apparently, with some relish—he always seemed to want to select the grass himself.

Mr. J. K. BATEMAN thanked Mr. Davies and the other contributors. He denied Major Kirk's assertion that greyhounds were fed on swill, if by that he meant the discarded rubbish outside the door. The greyhound trainer did not refuse to give his dogs water. In fact, the greyhound fed on liquid food did not want water for he consumed some six pints of liquid in a day. Mr. Muir had rightly said that it was to the practical man one must look for a good diet. As an example of such, Mr. Davies had given 1 lb. of meat a day with ¾ lb. biscuit. He himself never gave 1 lb. of meat a day. His greyhounds had on a average 1¼ to 1½ lb. of bread daily and about 8 oz. of meat. This was fed in conjunction with vegetable broth and salt.

Racing greyhounds wanted nutritious food with quick elimination. If fed stodgily they ran slowly. The aim was to give sufficient carbohydrate for bulk and energy and sufficient protein to maintain body weight.

With regard to cramp, acting on what Mr. Muir had said one could try vitamin B_1, but his own opinion was that excitement was the most prolific cause of cramp. The reduction of the excitement had proved to be the key to the problem in such cases.

Dr. J. T. EDWARDS, speaking, he said, not as an expert in dog breeding but as a pathologist who had taken some interest in nutrition, observed that he was impressed by what Mr. Knight had said about attempts at breeding leopards at the Zoological Gardens. At first sight it might be thought that useful information in regard to the proper feeding of dogs in a state of domestication might be derived from studying the feeding habits of wild carnivora in a state of nature. Indeed, apparently on analogy, a prominent veterinary teacher (Professor Wright), he recalled, had stressed that the proper diet of the adult dog was just meat. The problem, however, did not prove in practice to be quite so simple, as was clear from the variety of diets advocated by experienced dog feeders there that afternoon. Recalling the anxieties he himself had experienced in maintaining in good condition the Viceroy's pack of hounds during one off season while they were under his care in India, he had been forced to the conviction that when kept for any specific purpose, to attain maximum fitness for that purpose, the feeding and care of the breed of dog employed needed assiduous special study. Those who had "sat up" overseas for leopard or tiger over a "kill" knew very well that after the wild carnivore had killed its prey it first devoured at once the viscera, in particular the liver, and afterwards returned nightly to the carcase to consume the muscle flesh. A few years ago he was impressed by the explanation afforded in a series of articles [1,2,3] for this phenomenon, and for the grave disturbances liable to arise when the carnivorous animal was turned away to an omnivorous or almost purely herbivorous diet. The animal's instinct directed towards the immediate consumption of the liver, representing a large storehouse of more or less labile vitamins and other dietary factors, such as the "intrinsic factor" against pernicious anaemia, would at once be obvious. The delay in consumption of the muscle flesh, until it had undergone some degree of putrefaction would, however appear to be a safeguard against depletion of the "alkali-reserve" of the body. Ingestion of the fresh muscle, with its high degree of "acidity," would tend in time to disturb the acid-base equilibrium of the blood, resulting in progressively more pronounced symptoms of "acidosis" such as breathlessness, foul breath, languor, due to deleterious action on striped muscle, and eventually the frank ammonia-hunger exhibited by carrion-feeding. In a state of domestication, when for aesthetic and other reasons it was impracticable to allow the carnivore to imitate the feeding habits of its wild congener, the attempt was usually made, unwittingly, to mitigate the acidotic action of fresh meat by its admixture with a certain proportion of vegetables, such being usually alkaline in reaction. The problem of devising from the literature an ideal standard diet, however, nearly always proved in practice to be an extremely complicated one. For example, in the course of his own experiments, in which he had had to maintain large numbers of a wild insetivore—the hedgehog—he had found that on what appeared to be a perfect dietary consisting in the main of about one part of cooked meat to four parts of cooked wheaten biscuits and vegetables, with suitable "supplements," the animals in time were found *post-mortem* to be suffering from advanced osteoporosis or rickets. It was found by his colleague, Dr. H. H. Green, that the CaO : PO_5 ratio of this diet proved to be as wide as 1 : 7. The rickets in time disappeared when this was corrected by bringing the ratio down to about 1 : 1½. This was done by adding daily to each 6 lb. of the prepared diet 1 oz. of a "standard" salt mixture, comprising, per cent., calcium carbonate (precipitated chalk) 70, sodium chloride (common salt) 17½, potassium chloride 2½, magnesium sulphate (Epsom salts) 7½, iron citrate 2½, potassium iodide 1/20th. The chalk in this mixture would correct not only the calcium deficiency but also any likely disturbance to the acid-base equilibrium in the original diet. Many speakers had stressed the time-honoured custom of providing the household dog daily with a bone to gnaw: the animal's instinctive eagerness for this "supplement," and to bury it when it could before it could enjoy it, would seem now to have adequate explanation. He himself, in his limited experience, when peace-time prevailed, found that for his dogs a dietary consisting of one part minced raw meat well mixed with two to three parts of cooked vegetables (carrots, potatoes and greens), together always with a good-sized bone maintained them in perfect health. It had been asserted by some eminent physicians that when symptoms ascribable to dietary error were in evidence a good prescription to start with was a complete change to the opposite in the regimen, whatever it was. That would certainly be a rational though a haphazard attempt at restoring metabolism to normal from the cumulative effects of any ill-adapted dietary, besides having as a merit the psychological action which would be surely wrought on the patient (or its owner). As a pathological assistant at the Veterinary College in London some years ago, he was struck with the frequency of evidences of what might be called perhaps premature senility in the domestic carnivora in the form of chronic nephritis, namely, chronic interstitial nephritis in dogs and chronic parenchymatous nephritis in cats. These evidences occurring relatively early in adult life seemed to him possibly the sequelae of chronic dietary intoxication, though it was realised the exact cause still remained obscure. He had been impressed by the enlightenment that could be obtained upon certain conditions which appeared in this country in an insidious but now commonly prevalent form and were usually rather obscure in their origin but which appeared in certain countries abroad in a much aggravated form, and often there their origin could be more readily elucidated. For example, in India, the four major diseases of dogs, in his experience were, in order of importance, tick fever (piroplasmosis, caused by the two piroplasms, *Babesia canis* and *Piroplasma gibsoni*, each requiring different treatment, namely, trypan blue and arsenical compounds, respectively), Stuttgart disease, hookworm disease, and surra (caused by *Trypanosoma evansi*, now readily curable by naganol). Canine distemper,

[1] WEISCHER. (1934.) *Berl. tierärztl. Wschr.*, **50**, 289.
[2] OPPERMANN, I. (1936.) *Deutsche tierärztl. Wschr.*, **44**, 97.
[3] BICKEL, A. and GERFZ, L. (1936.) *Deutsche tierärztl. Wschr.*, 1937 **45**, 515 (Abstr.)

which had dominated the picture at home, had not come within his experience although it had been alleged to occur in a mild form by certain observers. Stuttgart disease, which now appeared to be caused, in part at least, by certain deficiencies of the vitamin-B complex, was truly an alarming problem to dog owners in certain stations, but to what kind of dietary error it was traceable he had not had an opportunity to find out. In regard to hookworm disease (caused by *Ankylostomum caninum*), his experience was that specific treatment, with carbon tetrachloride or oil of chenopodium, did not produce the lasting beneficial effects anticipated. Work in the laboratory showed that usually the effect of these drugs was to paralyse for a time the egg-laying capacity of the female worms in the bowel, causing a temporary spectacular drop in the faecal egg-count, which afterwards was restored when the female worms recovered. In some puppies that were weaned early and fed on cow's milk (which was notoriously deficient in iron) he had found, however, a surprisingly heavy faecal egg-count, which was not correlated with any such grave clinical symptoms as would have been expected from the worm burden. After reaching a more advanced age, when the puppies could be fed on an adequate adult diet, the worm infestation spontaneously subsided and concurrently the anaemia. It had indeed been found now by workers on human hookworm disease, commencing with observations made in Egypt a few years ago, that treatment planned to raise the resistance of the patient, by eliminating the symptoms of anaemia, was more successful in practice than treatment which had for its object the destruction of the worm parasites. Thus, medication with iron was more advantageous than direct anthelmintic treatment, with carbon tetrachloride or oil of chenopodium. This had been brought forcibly to his notice by his colleague, Mr. E. L. Taylor. Although it could not be generally proved that improvement in the diet raised the resistance of the host towards infectious disease, and in the case of certain virus diseases and some bacterial diseases, such as blackquarter, the contrary seemed to be proved, it was now abundantly clear that the degree of resistance of animals towards intestinal helminths was closely correlated with the state of host nutrition[5]. Hence, before the introduction of the newer remedies against red worms in horses,[6] the old prescriptions comprising arsenic, antimony, and iron had some valid basis for their employment. Incidentally, the experience recounted above illustrated the kind of derangement which might occur frequently in early weaned puppies in this country, where hookworm was absent, but the liability to anaemia was no less imminent.

Again, though the observations had certainly not come within the speaker's own experience, he had been much impressed by the observations recorded by Polar explorers on a certain rabies-like disease of dogs which commonly occurred in Arctic regions and the study of which possibly threw light on the now commonly prevalent canine hysterias of this country. These records had been recently well analysed by Baashuus-Jensen (1935).[7] The huskies used in these regions were often observed to become afflicted with paralysis, convulsions, and other nervous disturbances, such as howling, tendency to biting, wheeling, circling and other peculiar movements. It would seem that these symptoms arose when the dogs had been fed on the flesh of whale, walrus, or seal from which the fat had been removed for some other purpose, the "blubber" occurring in these species, as was known, subcutaneously and no fat being present between the muscle layers. In expeditions where extra rations of "blubber" were provided the dogs would appear to be safeguarded against the onset of the "Arctic dog disease," while in those in which lean meat or dried meat (pemmican) was provided, the dogs were decimated. Although direct proof did not seem to have been adduced, it would appear that the raw fat of the above species was necessary especially for its vitamin-A content, lack of which would produce neuro-muscular disturbances. It was not unlikely that some deficiencies of this kind occurred in the diets given to dogs in this country, particularly those consisting largely of cereals, some of which, according to Mellanby[8], were particularly prone to "sop up" any vitamin A present in the other ingredients of the diet. A good deal more work remained to be carried out on this problem.

Mr. T. L. Wright, commenting on the observation made by one speaker that the dog in a state of nature never ate bone even when food was scarce, said that he always maintained that it was natural to the dog to eat bones and digest them. In his view, the fact that we got trouble now when dogs ate bones was simply a matter of degeneration, dogs having had so many years of domesticated feeding. Where there had been many generations of dogs—as on farms, for instance—accustomed to bone eating they got along quite well, but a pampered dog was quickly rendered ill through eating them. In cases where one suspected that hard and nobbly pieces of bone were causing indigestion, one found that the simple administration of hydrochloric acid in doses of 5 to 15 minims three times daily well diluted, helped enormously.

In his view the eating of grass was a response to a call of nature, which told the dog that it wanted a clean out. Grass stimulated the intestine by irritation and cleared the stomach and bowel by vomiting or purgation. He had been struck by the value of cornflour gruel feeding for puppies which were afflicted with diarrhoea.

Miss J. O. Joshua expressed interest in the remarks which had been passed about the ingestion of bone, because her own observation had led her to believe that there was a good deal of individual and breed variation in the ability of the dog to digest bone. When the question of diet became difficult, she frequently found herself dealing with cases of rectal impaction and it was noteworthy how often the subjects of such cases were Scottish terriers. On the other hand, her own dogs ate bones fairly frequently and without any ill effect. She had also witnessed an allergic reaction to feeding raw meat; this tendency appeared to be an inherited characteristic.

Mr. E. R. Ambrose said that he had been hoping to hear a little more that afternoon with regard to nutritional disease as a result of war-time diets. He had been struck by the increase in the number of cases of true diabetes one met with nowadays. In nearly every case the history had shown that there had been excessive feeding of horseflesh in an uncooked state, to dogs that had not previously been used to it. It might be that these dogs had not been accustomed to dealing with this excessive amount of glycogen.

He was rather hoping that Mr. Muir was going to tell them something about vitamin H, because it had been suggested in Germany that vitamin H in adequate supplies could eradicate the ordinary non-parasitic skin diseases in the course of three weeks: that had not been his own experience.

Capt. Wright had raised the question of the ingestion of grass by dogs. If one observed a dog in the act of eating grass, one would notice that it always ate the same kind, the rough couch grass. It induced vomiting, but if that should not happen and if, as almost certainly would be the case, the grass remained undigested, it would cause rectal obstipation. The dog under completely natural conditions ate not only the bones of rabbits, etc., but the hair, flesh and skin too, and it was these which obviated the rectal obstruction.

The Replies

Mr. Davies, replying to the points raised in the discussion, said that some speakers had dealt with specific diseases, but he proposed to confine his remarks pretty closely to the subject under discussion. He wanted to stress again the fact that they had got to be careful to produce the healthy puppy and particularly to get healthy livers and kidneys in puppies. If these organs were damaged they could expect trouble later on in life. Undoubtedly there were several causes for nephritis, but he would mention that one of the primary causes was the damage to the kidneys in puppyhood. He was afraid he could not point to any one particular aetiological factor in nephritis: it must be caused by a series of defects in nutrition as well as by specific bacteria.

He could not see that the dog derived any benefit from eating grass, because as it had been said, the dog usually vomited the grass, or it caused diarrhoea: it had no chance of assimilating anything from the ingestion of grass. Rickets in the bigger breeds was quite a bugbear to the breeding of puppies, particularly if they were born between August and Christmas. It did not matter what was done in the matter of feeding or the administration of cod liver oil—they never seemed to get right until the sun appeared, after which one could expect some improvement.

One speaker had said that he could not distinguish between the so-called Stuttgart disease and haemorrhagic gastro-enteritis. The latter was quite an acute condition, whereas the so-called Stuttgart disease was a chronic affection.

Miss Joshua had referred to allergic reactions. It was quite possible that allergic reactions to certain substances ran in families: it ran in his own family; he could not touch an egg, so it was more than likely to be the same in the case of dogs. He was afraid he could not discuss anything in connection with diabetes: he had tested many samples of urine for sugar, but he had not yet found it.

Mr. Muir, who also replied, said that we lacked sufficient knowledge of the nutritive factors in foods to be able to explain why apparently very different diets gave equally successful results. He would point out, however, that claims for the success of any particular diet were not always clearly substantiated. Some people were not very precise in their statements of the nature and the composition of the diet and of the quantities fed. Again, some vitamin deficiencies took a year and even more than one generation to develop so that any diet must be tested over a long period of time before it could be accepted as satisfactory. A dietary deficiency of vitamin H (biotin) was responsible for the appearance of certain skin lesions in the rat, but so far as he was aware it had not yet been shown that these lesions were the same as those exhibited in any skin disease in the dog. On the general relationship between vitamins and disease he would add that we were now beginning to learn something of the effects of long-continued, sub-minimal intakes of vitamins and he believed that observations along these lines would prove of immense interest to clinicians.

War-time Nutrition and its Lessons for the Future

At a meeting of the Royal Society of Arts,[1] presided over by Lord Woolton, Professor Drummond said that as a result of scientific work and information supplied by the nutrition surveys carried out by Sir John Orr and others we were in an incomparably stronger position for formulating a food policy than we were in the last war. Methods of rationing have resulted in much fairer distribution of food than during peace-time and we cannot see ourselves reverting to a state in which the consumption of milk can be seriously restricted by lack of purchasing power. A recent large-scale experiment in London has shown that improved nutrition of pregnant women throughout the country would save, chiefly by the prevention of pregnancy toxaemias, 10,000 lives a year.[2] The health of the babies would also be greatly improved. No post-war policy should permit the expectant mother, through lack of financial means, to suffer from deficiency diseases.

The provision of school meals has been stoutly but illogically opposed, on the ground that it interfered with "parental influence," by people who send their children to boarding school for nine months of the year. I hope (said Professor Drummond) to see the day when every child in the country shall be able to get a good nourishing meal at school if his parents so wish.

The prejudice against milk and salads is being overcome and the allotment movement is bringing great benefit and should continue after the war, as should British Restaurants and works canteens. The present effort to educate the population about food and food values and to raise the level of nutrition is unparalleled except in Soviet Russia, where impressive advances have been made. A nation-wide propaganda campaign on the importance of sensible feeding is being commenced in the U.S.A. In that country much harm has been done by the commercial exploitation of vitamins. The nutrition policy now being advocated in the United Nations and implicit in the Atlantic Charter, particularly the great increase in milk consumption, will involve an agricultural revolution. An agricultural economy based on the limitation of supply is incompatible with human welfare.

In Canada and the United States the medical profession is solidly behind the new nutrition policy, but doctors in this country are apathetic. The hard fact is that few outside the younger generation realise the significance of the new knowledge of nutrition. It has been said that it is better to build a fence at the top of a cliff than to maintain an ambulance at the bottom—it is also much cheaper. It is fair to say that a group of intelligent housewives could talk more sense about food values than a random selection of middle-aged or elderly medical men. The fault, and the remedy, lies in medical education. The average student gets nothing like a proper comprehension of a subject vital to his whole life's work.

War has few virtues, but it undoubtedly stimulates activity in many fields of enterprise and problems can be lifted clear of political dispute. This war of liberation will offer some compensation if it brings nearer by years the day when every man, woman and child will be able to obtain food essential to health.

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[4] Salah, M. (1935.) *J. Egypt. med. Ass.*, **18**, 425, 438, 455, 473.
[5] See Taylor, E. L. (1936.) *J. Roy. Agric. Soc., Eng.* (*Farmer's Guide*), 203.
[6] See Houdemer, E. (1935.) *Rev. vét. milit.*, **19**, 409.
[7] Baashuus-Jensen (1935). *Skand. Vet.*, **25**, 310; *Vet. J.*, **91**, 339, 379.
[8] Mellanby, E. (1931.) *Brain*, **54**, 247.
——. (1934.) "Nutrition and Disease" (Oliver and Boyd, London).

[1] *J. Roy. Soc. Arts*. **90**. 422.
[2] *Lancet*. 1942. ii, 10. See, however, *Brit. Med. J.* 1942. i, 699 and 802.

THE VETERINARY RECORD

August 22nd, 1942

HUMAN NUTRITION AND VETERINARY EDUCATION

"A knowledge of health, and of the ways and means which tend to preserve and improve it, comes no less within the province of the veterinarian, than do the rules of science by which he is taught to understand and cure disease: in fact so reciprocally do the states of health and disease run into each other, that without an acquaintance with the former we should oftentimes find ourselves unable to detect the latter."—W. Percival. (1834.) "Introduction to Hippopathology."

BY a coincidence two papers dealing with related problems were published in the same number of *The Journal of the Royal Society of Arts*. Sir Arthur Olver's address* outlined the problems of animal husbandry in India. In that country conditions are somewhat similar to those in Great Britain before the industrial revolution; the human population is only 17 per cent. more numerous than the animal and is dependent for its food, either directly or indirectly, on farm livestock. Professor Drummond's address, a summary of which appears in this issue, deals with the present and future problems of human nutrition in Great Britain.

Men occupied by the affairs of industry and commerce are often unaware that in the last resort, the future of the world's industrial population depends on the maintenance of soil fertility. This in turn depends largely on the proper management of farm animals, which also contribute directly to human nutrition.

Although Great Britain is the largest food importing country, home agriculture still plays an important role in the feeding of the population.† Under the stimulus of war and post-war conditions which severely limit both the import and export trades, British agriculture must play a much greater part than formerly in maintaining the health of our population. But, it will only be able to do this if *to-day* we have far-seeing education, research and administration. It behoves us, therefore, to consider, particularly in relation to other countries, whether veterinary research and education is developing along really sound lines.

Whatever the value of present-day research may be, future work depends more on the quality of teaching at our colleges than any other factor. When director of the Mukteswar Research Institute, Dr. Edwards maintained that Indian Veterinary students should receive post-graduate training in India amongst their own problems and not, as a rule, be sent to England; in this he was supported by Stockman. The wisdom of this decision has been proved by subsequent events and is emphasised by Sir Arthur Olver's address. From the study of a few major diseases the scope of veterinary research in India has now been widened to include not only all diseases, whatever their origin, but also the study of animal nutrition and genetics and even economic problems concerned with marketing the products of animal husbandry. In India, and also it may be noted in South Africa and Australia, there are teaching and research institutes able to deal with all aspects of animal production. Students at the Lahore Veterinary College, for example, are trained in animal husbandry at the Hissar farm of 42,000 acres on which there are over 1,000 cattle.

It was a progressive, and the more optimistic of us thought, a significant step, when the name of Animal Disease Division was changed to Animal Health Division of the Ministry of Agriculture. Unfortunately, however, the Division has given the impression that it is completely occupied by the administration of the animal diseases Acts and Orders, and only recently has there been some evidence that it is beginning to justify its new name by studying nutrition, genetics and other problems of animal production essential to the initiation of a *positive* animal health policy. Although the Ministry is absorbing numbers of recent graduates their training is left to the efforts of colleges, which lack adequate equipment or financial support, and to the efforts of a few devoted practitioners. This state of affairs together with the tendency (we hope it is not a policy) for more and more research to be carried out at specialised institutes where it has no educational value can hardly be allowed to continue without serious consequences.

To use Sir Arthur Olver's words, "it can fairly be said that, owing very largely to Government neglect, there is no other country in which livestock has such tremendous importance or in which so little has been done for veterinary education. As a result, the necessary facilities are still not available at veterinary colleges in this country for adequate practical instruction." This is an even more serious accusation when one realises that we have the responsibility of providing veterinary surgeons both for the home country and the colonial empire.

A frank admission of the defect is, however, a real advance and we do not overlook the fact that much good work has been done and that there are signs of improvement. We were particularly pleased to learn that the Liverpool Veterinary College now has a field station and we feel sure that the fullest use will be made of the available facilities for teaching and research. It may be hard for men who have laboured for years to make colleges as efficient as possible to accept Sir Arthur Olver's criticisms, but it is a false loyalty that would prevent improvement by pretending that all is well.

Professor Drummond explained the fundamental need for changes in medical education. Sir John McFadyean's whole life exemplified his conviction that the progress of veterinary science must, in the first place, depend upon the training of veterinary students. The Royal Commission on Agriculture in India (1928) said: "The future of veterinary medicine in this country will largely depend upon the attention which is paid in the next few years to the staffing of the veterinary colleges." In order that they shall become centres for the highest conduct of veterinary education and research, "we have recommended that they should be manned by a staff of the highest calibre, capable not only of initiating and directing all branches of veterinary research but also of creating and maintaining an atmosphere of research in which Indian students may find inspiration and opportunity to develop to the full their natural capacity for this class of work."

It is clear that the profession can contribute to Professor Drummond's ideal and the aim implicit in the Atlantic Charter, of providing an adequate diet for the whole human population, by assisting in the development of sound methods of livestock production at home and throughout the colonial empire. But, to achieve this end, plans must be laid *now* for fundamental improvements in veterinary education; we feel that the time has come when the State will have to shoulder a far larger share of the responsibility for training veterinary surgeons.

* See *Veterinary Record*, July 25th.

† Two-thirds of our food is now produced at home.

Weekly Wisdom

"*It is probably only the professional teacher who appreciates to the full the profound difference that there is between the whole outlook of the student whose most receptive years have been passed in a university in which the staff is actively engaged in research, and the outlook of one whose training has been confined to an institution devoted solely to teaching. . . .*

"*If research is not to be a part of the regular activities of the teaching staffs of our universities, two results will surely come to pass: first-class men will not seek office in our universities, and a mass of mediocre and unthinking graduates will encumber the field of intellectual life* [*veterinary science*]. *It is time that we made a choice in this matter.*—Professor F. Wood Jones. Lecture at the Medical Congress, Adelaide, 1937.

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Recognition of the aims and efforts of the Guild of Agricultural Journalists is to be found in a number of contributions from bodies prominently associated with agriculture. They include the following:—

The National Farmers' Union, 100 gns.; Central Landowners' Association, 50 gns.; British Dairy Farmers' Association, 10 gns.; Royal Lancashire Agricultural Society, 2 gns.; and the Royal Agricultural Society of England, £25.

CLINICAL COMMUNICATION

Post-Operative Peritonitis Successfully Treated by Intraperitoneal Implantation of M & B 693

A. NOEL ORMROD, M.R.C.V.S.
Woodchurch, Wirral

An Alsatian bitch was brought to me for examination on June 15th. The case was a typical pyometra and operation was advised.

On the following day an ovaro-hysterectomy was performed under nembutal supplemented by ether and oxygen. The patient was very fat and the operation was rendered difficult and somewhat prolonged.

On the fourth day following the operation the temperature of the bitch fell to 99·6°. She was very uneasy and the abdominal wall was hard and painful when handled. The wound was discharging a sanguineous pus. Peritonitis was diagnosed and the owners warned. I was requested to spare no efforts to save the animal.

The wound was cleansed and several sutures removed for more easy drainage and M & B 693 tablets were given in the recommended doses.

Twenty-four hours later the condition of the patient was still alarming, but the temperature had risen to 100·2°.

Drastic measures were deemed to be as wise as any and the bitch was again anaesthetised by an intravenous dose of nembutal. The wound and skin were cleansed and disinfected and under as aseptic conditions as possible the abdomen was re-opened, the original sutured wound being completely excised by enclosing it in an elliptical incision. The effect of this was to remove a strip of abdominal floor about one inch in breadth and four inches in length. A quantity of thin blood-stained pus escaped from the peritoneal cavity as it was opened.

The cavity was then irrigated with normal saline at 105° and mopped out as carefully and thoroughly as possible, five pints of saline being used. Portions of the omentum had a very unpleasant appearance and where it was considered prudent these areas were excised.

Finally M & B 693 powder was dusted into the peritoneal cavity, all suspicious-looking areas receiving individual care and thorough dusting. The incision was closed, using only two layers of sutures, the edges of each layer being freely dusted with the M & B powder. A pad sprinkled with the powder was applied and the abdomen bandaged.

The day was a warm one and with little hope for her survival the patient was left on blankets in a sunny corner of my garden to recover from the anaesthetic. This recovery period was prolonged, it being about 30 hours before co-ordination of movement returned.

The administration of M & B 693 *per os* was recommenced as soon as the bitch was able to swallow.

From this point recovery ensued without further disturbance and with most surprising but gratifying rapidity. The wound healed by first intention and remained clean and dry throughout. The sutures were removed after seven days and after a further two days the bitch was discharged.

THE MILK SUPPLY

"It is never easy to distinguish between fact and propaganda," writes "Blythe" in *The Farmer and Stock-breeder*, "and I fear there is a good deal of misunderstanding with regard to milk supplies. In reviewing the food position writers and speakers are continually telling the public that among the notable achievements of the farmers has been a large increase in milk production. I should, of course, be the last person to seek to foul my own nest, but I believe the truth is that less milk, rather than more, is being produced. Less milk is going into manufacture or being retained on the farm for normal purposes, consequently more milk is being consumed as such by the general public. And still more is needed.

"Some think that a widespread adoption of artificial insemination would (in time, of course) lead to greater individual outputs of milk. It might be so, but before we launch into uncharted seas it would seem desirable to decide just what sort of cow will serve the national interest. When concentrated food could be imported in abundance and meat of high quality was obtainable from Argentina we could go for milk regardless of meat, but in different circumstances milk-cum-meat might be the more suitable objective. Anyway, we may need the kind of cow that will make the best possible use of home-grown foodstuffs. Why does not one of our research stations compare different breeds or types in this respect?"

ANNOTATION

Nutrition of the Bacon Pig with special reference to Necrotic Enteritis and Allied Conditions

Among recent contributions to our knowledge of the nutrition and development of the bacon pig, those made in Hammond's laboratory at Cambridge by McMeekan (1940-41) are in many ways outstanding. An extensive examination of male animals (of an in-bred strain of Large Whites), killed at monthly intervals from birth to 28 weeks of age, confirmed that there was a well-defined pattern of development, the new-born picture of "largely head, neck and legs" being followed by an initial increase in proportional length, and later by an increasing tendency towards a deepening and thickening of the body. At bacon weight the size of the hindquarters exceeded that of the head and neck. These changes in body proportions were accompanied by marked alterations in the relative amounts and chemical composition of different tissues, and in the relative growth rates of the body cavities and viscera. Bone, muscle and fat were laid down in that order: at birth the percentage of bone was relatively very high, and that of fat very low, whereas at bacon weight this was reversed. Muscle was laid down much earlier than fat, being overtaken by the latter *at about 16 weeks of age*. Subsequently, the relative rate of fat deposition was increased still further, until at 24 to 28 weeks of age about 50 per cent. more fat than muscle was being laid down.

These data were utilised in later experiments in which the plane of nutrition was varied. By varying the intakes of qualitatively identical rations (separated milk, fishmeal, and cereals, and, pre-weaning, controlled access to sow and to creep ration) four types of growth curve were produced as from birth to 200 lb. live weight, *viz.*, those resulting from (1) a high plane of nutrition throughout; (2) a high plane from birth to 16 weeks, and a low plane subsequently; (3) the converse of (2); and (4) a low plane throughout. The feeding was so arranged that the four groups attained 200 lb. live weight at 180, 240, 240 and 300 days respectively. As McMeekan states, it is reasonable to believe that the resultant four types of growth curve represent broadly the major differences distinguishable in all classes of animal production, all existing to a greater or lesser degree in all countries as a result of variation in the efficiency of the husbandry and in the natural food supply.

At 16 weeks of age the average live weight of the high-plane pigs was 113 lb., compared with 37 lb. for the low-plane group, and differences between the respective body proportions and tissues were striking. The differences were equally marked in animals slaughtered at 200 lb., the data at which time are especially interesting from present considerations in the group (3) or "low-high" pigs. Poor feeding in early life was shown to have penalised muscle to a large extent, and while the change to better nutritive conditions had permitted of considerable recovery, this was insufficient to enable the animals to make up their initial deficiency as compared with the "high-low" animals in group (2). In the later stages of fattening, fat deposition was predominant in all groups. The data provide strong indication that the good development of the highly-important "eye" muscle is dependent upon a high plane of nutrition, although they do not altogether accord with the view that "defective" development of this muscle is due to inadequate nutrition early in life.

McMeekan points out that, although nutrition alone was employed as a factor in his studies, "other environmental factors, such as parasites, temperature, light and exercise (in search of food) are similarly capable of affecting the rate of growth in the animal by quantitative control of the nutritive energy available." To this list one may add, with due qualification as to the nature of the effect, the important bacterial and virus diseases of the young pig, as well as deficiencies such as piglet anaemia. Of this group, the most important non-notifiable condition is pig paratyphoid (*Salmonella suipestifer* infection), the usual cause of "necrotic enteritis." Its effects, even though percentage recovery may be high, are more serious than those due to inadequate nutrition over the period in which it is clinically obvious, and, as Slavin (1942) has succinctly pointed out, the word "cure" has a special meaning in connection with it. To be justified, the veterinary treatment of food animals must be economically sound; humanitarian considerations are rarely at variance with the thesis of "cutting one's losses." The practitioner should be able to assess not only the possible chances of recovery from a disease, but also the probable future performance of the animals should that recovery occur. In the absence of precise information as to the carcase qualities of animals which have been finished after "recovering" from anaemia, influenza or paratyphoid, he must depend upon a sound knowledge of pig husbandry, and upon the results of studies such as those discussed here. Insistence that regular recorded weighings be made of all fattening stock will prove helpful.

The question of swill-feeding is not far removed from present considerations, and is especially important to those practitioners who are acting as advisers to pig clubs and other projects. The writer has been privileged to investigate a highly successful enterprise carried out by a municipal authority in the London area. The rapidity of growth and quality of the finished baconers are remarkable in view of the fact that swill alone is fed subsequent to arrival of the animals on the premises, and were the proposition a commercial one the profits would undoubtedly be large. The reasons for success are several: the swill is of good quality and properly handled; the animals are bought well-started from a farm, not on the open market, and are handled skilfully and hygienically, without constant handling by strangers (a serious fault on many farms); while the project is subject to routine veterinary inspection and advice. Most important of all, the animals are never purchased until at least the 15th week of life, by which time the danger from necrotic enteritis, and most other post-weaning diseases (swine fever and swine erysipelas excepted) is largely over, and the critical period of muscle growth is nearly passed. Were all swill-feeding carried out with such care, the results would undoubtedly be sufficient to revise current opinions of its value.

[Limitation of space has restricted this annotation to one or two aspects only of the many which could have been dealt with under the pre-selected title. Investigations concerning the rôle of vitamin deficiency in the production of a necrotic enteritis in pigs free from *S. suipestifer*, and also of the effects of vitamin deficiency upon *S. suipestifer* infection, have been carried out at Weybridge, and will be published in due course. A mention of some of the more important findings has been made by Slavin in the discussion following Powley's (1942) paper.]

ALASTAIR N. WORDEN.

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SLAVIN, G. (1942.) The economic factor in the treatment of paratyphoid in pigs. *Vet. Rec.* **54.** 48.

* Copies of the whole of this work, bound together, may be obtained, price 3s., from the Librarian, School of Agriculture, Cambridge.

POST-WAR EUROPEAN LIVESTOCK POSITION

Horses are likely to be fewer in Eastern Europe after the war. Information obtained by the Technical Advisory Committee on Agriculture of the Allied Post-War Requirements Bureau shows that large numbers of heavy horses have been requisitioned for the use of the German Army, especially for its winter campaign in Russia. There is considerable danger that in some countries lack of horse-power rather than of man-power or supplies will hold up production after the war.

Proposals have been laid before the Agricultural Advisory Committee for the training of men now serving in the Allied Armies as tractor drivers and mechanics in order that the lack of horses may be made good by mechanised cultivation.

Reports have also been received by the Committee concerning the extent of the destruction of livestock herds since the German invasion In most countries the lack of feeding-stuffs has meant a very heavy drop in the numbers of pigs and poultry and a somewhat less but still serious decline in cattle.

At the same time the weight of livestock slaughtered and the yield of milk has gone down, so that food supplies have been reduced more rapidly than the actual numbers of animals. The Allied Post-War Requirements Bureau has been considering the relation of this decline to the necessary imports of foodstuffs into Europe in the period immediately after the war; provisional estimates have been prepared and circulated by Allied delegates. It is for the Agricultural Advisory Committee to devise a plan for gradually restoring livestock herds to their former level.

The proposals put forward by Allied delegates refer in the main to methods of speeding-up natural increase by the importation of superior breeding stock and improved veterinary services. They also cover the restoration, by the immediate supply of grass and clover seeds, of pastures ploughed up on Nazi orders and the increased production of other kinds of fodder.

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An adequate sum spent on hill sheep farming to-day would give the nation a greater return than any other expenditure of a similar sum in the way of food production.—*Farmers' Weekly.*

REVIEW

[**HEALTH OF THE FUTURE.** By ALECK BOURNE. Penguin Special No. 107. Penguin Books, Ltd., Middx. Pp. 192. 9d.]

"To resist evolutionary change has always been, and always will be, one of the fatalities of mankind. Resistance to evolution leads ultimately to subservience to revolution." That deliberate planning of the future is a pressing need is obvious to everybody. We have come to recognise that the health conditions of the people are bad because of failure to apply knowledge and to remove causes rather than uncontrollable circumstances.

There is a large percentage of the population that is suffering from sub-health caused by poverty, fear and ignorance. The poor cannot afford sufficient amounts of fish, butter, eggs, meat, milk and fruit; they also suffer from overcrowding, wrong feeding, lack of fresh air, exercise and sun. The result is that their childen are below the standard in weight and height, they are anaemic, rickety and susceptible to infection. The adults of the poor classes suffer from diminished energy and depression, having little interest or enthusiasm in their work, many of them spend their leisure in public houses to escape from dark, overcrowded, ill-ventilated houses. They find no peace and comfort in their homes such as the wealthier enjoy.

Fear of losing their jobs, of being incapacitated through illness, or of being unable to support their elderly relatives is an acknowledged predisposing cause of mental and physical disease. The demoralising effect of enforced idleness, anxiety, bad nutrition and despair are inevitable sources of physical ill-health and should be brought before the larger public to make them realise the causes of disease and what it is costing them due to the short-sighted policy of a Government who will spend money on curative medicine, but who have no constructive policy on preventive medicine.

There is at present too much treating of the symptoms and not enough done to get at the root of the cause. The free meals and milk at schools help towards alleviating the bad nutrition of the poorer children, but it points to the defects in our economic system that we should be reduced to accepting social "sops" to compensate for radically bad causal conditions.

Medical students destined for general practice should be taught that by treating the commoner minor disorders, they are probably rendering the community a greater service than by concentrating on the rarer diseases. They should also be taught that health is a positive state to be maintained, whereas disease is a negative state to be avoided. At the moment too much stress is given to the importance of rare and complex pathological conditions. The relation of environment and occupation to health and the preventable noxious influences which affect our lives are given insufficient attention. It would greatly improve matters if the prospective general practitioners took classes in economics and sociology and so broadened their outlook on human life as a whole instead of concentrating on phyiscs, chemistry and biology after matriculation. As it is, at the end of the training much has been learnt about disease and technical scientific knowledge but little about the human aspect of medical work.

Ignorance is another cause of ill health; everyone should be taught the elementary but vital principles of nutrition, prophylactic treatment, preventive inoculations, physical exercise and how to make use of one's leisure. Housewives should know the proper food values; what to buy, how to choose it, how to cook and to serve well-balanced meals.

In short, the public must be educated as to the necessity of a more efficient medical service. Planning must be based on a comprehensive survey and greater publicity given to all that is going on in the scientific world. Books and articles, such as "Health for the Future," should be written, so that all can read and understand. It is only by such education that the large masses of people will come to realise that the medical service must be modified and evolved to meet changing conditions. New proposals meet with great opposition chiefly because people do not understand the reasons and they are afraid of control and how it will affect their lives, but though many people objected at first to the National Health Insurance and other State medical services such as the School Medical Service and the Industrial Health Service, and still criticise the mode of administration, few would agree to scrapping these services altogether. If the general public has the opportunity to read about the proposed new medical service, discuss it, hear and read opinions on both sides, then they will lose their prejudices and accept the ideas more readily.

"Health for the Future" discusses all the failings of the medical service, draws attention to the inequality of availability of all the resources of diagnostic and therapeutic treatment, to the constant overwork of the G.P., which kills his enthusiasm and interest in

(*Concluded at foot of col.* 1, *p.* 344.)

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Aug. 22nd.—W.A.E.C. Demonstration at Swansea, 2.30 p.m.

Aug. 25th.—W.A.E.C. Demonstration at Ayr, 2 p.m.

Aug. 29th.—W.A.E.C. Demonstration at Maesllwch Castle, Mid-Wales.

Sept. 2nd.—Meeting of the North Wales Division, N.V.M.A., at Bangor, 1.30 p.m.

Sept. 20th.—Entries for Miss Aleen Cust Veterinary Research Scholarship (R.C.V.S.).

Sept. 24th and 25th.—N.V.M.A. Annual General Meeting and Conference, Holborn Restaurant, High Holborn, W.C.1. Annual Luncheon, Mansion House, City of London (Sept. 25th).

Oct. 13th.—R.C.V.S. Council and Committee Meetings, Royal Station Hotel, York.

Oct. 14th.—R.C.V.S. Council and Committee Meetings, Royal Station Hotel, York.

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N.V.M.A. Annual Meeting and Conference

The annual general meeting of the Association will be held, this year, on Thursday and Friday, September 24th and 25th, the business meeting to be interrupted after the presidential address, in order that discussion may take place on the general subject of "The Veterinary Surgeon in the National Economy." The meeting will open at 10 a.m. on the 24th, and after preliminary formal business, the President will give his address. Following the address, the meeting will adjourn until 4 p.m., Friday, September 25th.

After the presidential address on the Thursday, a discussion, which will continue throughout the day, will be initiated on "The Veterinary Surgeon in Inspection and Control of Meat and Milk."

On Friday morning at 9.30, there will be a discussion on "Preventive Medicine on the Farm." It is hoped that some veterinary surgeons, representative of the allied nations, will participate in these discussions. This second discussion will be followed by the annual luncheon, which will take place at the Mansion House, City of London, with the Lord Mayor, Lieut.-Colonel Sir John Dawson Laurie, T.D., as the principal guest. The Association anticipates the pleasure of entertaining, also, some other distinguished personages interested in the profession.

After the luncheon, there will be a meeting of Council, which will be followed by the adjourned annual general meeting.

The annual general meeting and the discussions will take place in the Council Room of the Holborn Restaurant.

Further details of the Conference will be published as soon as possible.

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Survey Scheme : Negotiations in Scotland Completed

A conference was held in Edinburgh on Wednesday, August 12th, between the N.F.U. and Chamber of Agriculture for Scotland and the Scottish Branch of the N.V.M.A. when a scale of fees for the work under the Survey Scheme was negotiated.

The representatives of the Scottish Branch were the President (Mr. Geo. Sangster), the President of the N.V.M.A. (Dr. W. R. Wooldridge), the Chairman of the Survey Committee (Mr. H. W. Steele Bodger) and the Hon. Secretary of the Branch (Prof. Geo. F. Boddie). Mr. D. Campbell was unable to be present owing to an accident. The conference was also attended by representatives from the Animal Health Division of the Ministry of Agriculture and Fisheries, the Department of Agriculture for Scotland, the Highland and Agricultural Society and the Milk Marketing Boards in Scotland.

The scale of fees was considered at a meeting of the Council of the Scottish Branch held on Wednesday, August 19th, and the action of the Branch representatives was endorsed. It is understood that the scheme and the scale of fees is to be reviewed at the end of twelve months from the date of the inception of the scheme in Scotland.

The scale of fees adopted for Scotland is :—

In herds not exceeding 25 cows, 11/- per cow.

In herds not exceeding 50 cows, 10/6 per cow.

In herds containing 51 cows or more, 10/- per cow.

Heifers from the age of six months till the date of the first calving, 2/6 per animal.

In the case of contracts for more than one year these fees will be reduced by 10 per cent. in the second year and by an additional 10 per cent. in the third year.

If the herd is situated more than 10 miles from the veterinary surgeon's premises a charge of 4d. per mile will be made.

The other provisions of the scheme in respect of laboratory services, supply of vaccines and sulphanilamide are identical with those arranged for the scheme in England and Wales.

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UNIVERSITY OF LONDON EXAMINATIONS IN VETERINARY SCIENCE

The following is the Pass List (July, 1942) for the First Examination in Veterinary Science, University of London: Cleverly, Dora Catharine; Lewis, Thomas Rees Brian: Murray, Mitchell Durno; Ridley, William; Roberts, Howell Emlyn, all of the Royal Veterinary College; Hart, Charles Barrington, Highgate School.

The following Higher School Candidate has completed exemption from the First Veterinary Science: Daykin, Philip William, Royal Veterinary College.

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PERSONAL

Birth.—Beynon.—At Lytham-St.-Anne's Hospital on August 1st, 1942, to Margaret, wife of A. Gwyn Beynon, M.R.C.V.S., D.V.S.M. (Vict.), a son.

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Marriage.—Morris—Davies.—On August 10th, 1942, at All Saints, Llanelly, Lewis Trevor Morris, N.D.A., M.R.C.V.S., Animal Health Division. The Ministry of Agriculture and Fisheries, Carmarthen, to Lavine, only daughter of Mr. and Mrs. Gildas Davies, Llanelly. The groomsmen were Mr. W. Ross Cockrill, M.R.C.V.S., and Mr. D. B. Davies, M.R.C.V.S., also of the Animal Health Division.

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ROYAL ARMY VETERINARY CORPS

The following announcement is made in the issue of *The London Gazette*, dated August 11th, 1942: To be Lts., 1st July, 1942:—John Henry Parsons (236716), David Arthur Dempster Brydon (238373).

* * * * *

That the spread of foot-and-mouth disease from the outbreak at Morebath was caused by the movement of rabbits, foxes and birds, was the opinion given by the divisional inspector of the Ministry of Agriculture to Devon Diseases of Animals Sub-committee at a recent meeting. It was decided to waive sheep-dipping regulations under which sheep have to be dipped between July 15th and August 20th, as, according to the chairman, it was difficult to enforce the regulations in areas infected by foot-and-mouth disease.

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his work, to the lack of co-operation between the different services. Plans for the future are carefully and clearly considered and the right of man to health, his duty to maintain it and the fact that he should be ashamed of ill-health is emphasised. Such a book as this develops a conscious responsibility towards health and an interest which inspires one to further reading and discussion.

[This review may be compared with Professor Drummond's address summarised in this issue and the description of Soviet medicine in the *Lancet* (1941, ii, 138). It is significant that a chair of Social Medicine has now been established at Oxford University. (*B.M.J.*, 1942, ii, 101.)]

SCHEME FOR THE CONTROL OF DISEASES OF DAIRY CATTLE

STATEMENT SHOWING THE NUMBER OF UNDERTAKINGS NOTIFIED TO THE MINISTRY OF AGRICULTURE DURING THE WEEK ENDED AUGUST 15TH, 1942.

County	Undertakings Notified		Total Undertakings		
	During Week	Previously	No.	No. of Cattle	
				Cows	Heifers
ENGLAND					
Bedford	1	15	16	436	261
Berks	3	25	28	898	615
Bucks	1	20	21	622	480
Cambridge	1	6	7	178	88
Chester	23	140	163	5,367	1,991
Cornwall	—	—	—	—	—
Cumberland ..	5	13	18	573	526
Derby	13	38	51	1,722	904
Devon	8	53	61	1,001	706
Dorset	—	11	11	365	209
Durham	10	93	103	2,332	685
Essex	10	75	85	3,741	2,291
Gloucester	—	28	28	942	544
Hampshire	23	99	122	4,025	2,522
Hereford	—	9	9	205	76
Hertford	—	30	30	954	643
Hunts	1	1	2	49	32
Isle of Ely	—	—	—	—	—
Isle of Wight ..	—	4	4	55	15
Kent	11	38	49	1,082	651
Lancs	4	71	75	2,259	741
Leics	2	17	19	540	389
Lincs (Holland) ..	1	2	3	35	5
„ (Kesteven) ..	1	5	6	72	57
„ (Lindsey) ..	9	9	18	335	117
Middlesex	—	1	1	30	—
Norfolk	11	70	81	2,638	1,574
Northants	1	24	25	779	623
Northumberland ..	7	21	28	836	396
Notts	2	21	23	685	273
Oxford	2	13	15	419	502
Rutland	—	6	6	110	68
Salop	9	88	97	3,338	1,677
Soke of Peterborough	—	—	—	—	—
Somerset	3	45	48	1,397	541
Staffs	14	67	81	2,449	1,126
Suffolk, E.	7	20	27	644	417
„ W.	3	14	17	307	225
Surrey	3	40	43	1,303	545
Sussex, E.	6	63	69	1,784	901
„ W.	2	41	43	1,252	865
Warwick	7	40	47	1,268	777
Westmorland ..	—	5	5	103	164
Wilts	2	30	32	1,411	620
Worcester	7	71	78	1,806	789
Yorkshire, E.R. ..	5	9	14	311	144
„ N.R. ..	9	41	50	1,036	548
„ W.R. ..	10	67	77	2,215	702
WALES					
Anglesey	1	7	8	161	50
Brecon	—	2	2	25	9
Carnarvon	8	46	54	1,295	516
Cardigan	—	11	11	166	117
Carmarthen ..	4	111	115	1,993	1,101
Denbigh	3	23	26	591	260
Flint	2	42	44	1,013	511
Glamorgan	2	32	34	501	219
Merioneth	—	2	2	23	23
Monmouth	—	14	14	411	218
Montgomery	—	1	1	83	82
Pembroke	8	35	43	875	549
Radnor	—	—	—	—	—
TOTALS ..	265	1,925	2,190	60,956	31,680

Note.—Of the total of 2,190 undertakings notified to date 627 are for 1 year, 124 are for 2 years, and 1,439 are for 3 years.

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MINISTRY OF AGRICULTURE NEWS SERVICE

Arable Dairying

More Milk to the Acre.—It was demonstrated at the end of the last war that 500 gallons of milk per acre could be produced from soiling crops, compared with 200 gallons from grassland. Such a system, however, is costly in labour, seeds and fertilisers. It requires rich, free-working soil and a regular rainfall to ensure that the various crops will be available when wanted and a large bulk obtainable before maturation goes too far. Even so, soiling was shown to be unable to compete with grassland in the production of cheap milk in May and June. It was found that fresh-calved, high-yielding cows fell off when soiling crops were fed and recovered when silage, hay and roots were given. It seems, then, that the drop in yield can hardly be attributed to excessive bulk, but more probably to the state of maturity of the soiling crop.

Only young, tender, succulent forage is equivalent to grass in feeding value, and individual soiling crops quickly outgrow the tender stage and decline in feeding value. Successional soiling crops entail many plots and many sowings. A miss is a calamity and when sometimes owing to vagaries of the weather crops intended to be successional come to profit at the same time, surplusage occurs which may be difficult to utilise economically. Surplus soiling crops have no sale value and may be unsuitable or too small in quantity for disposal as hay or silage. In general, therefore, soiling is a method to supplement, not to supplant, grazing, and it is in this connection that it can help to overcome the difficulties inherent in a policy which demands more wheat coincidently with the maintenance of the milk supply.

The most successful soiling crop in the demonstrations was a mixture of oats, beans and tares. Lucerne was practically a failure on the soils and in the parts of the country (Notts, Middlesex and Cornwall) where the trials were made. This, however, is not to rule out lucerne in those parts of the country where it is known to thrive. In such circumstances it may be the cheapest, most productive and most reliable of all summer forages.

Until grass comes in spring or until the oat-legume mixture is ready there is a choice of mangolds or silage. Both were highly satisfactory in the arable dairy demonstrations. For autumn there is maize in suitable districts or kale. Pea and oat hay was invariably productive, but sometimes rather difficult to make. New leys are more productive than old grassland where they can be established quickly, but in the drier parts of the South some time may elapse before they knit together closely.

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Isle of Thanet Farmers Point the Way.—Dairy farmers who relied on grass and imported concentrates for pre-war milk production had serious misgivings when they were asked to plough up pasture. Happily, home-produced feeding-stuffs from the new arable land have offset to a large extent the acute shortage of feeding-stuffs from overseas and the rapid development of the new system puts an increased milk supply well within range. In most areas, of course, grass is an integral part of dairy farming, but there is one small area in Kent where it is the least consideration. Farmers in the Isle of Thanet rely all the year round chiefly on green fodder crops and oats in addition to a small allowance of protein cake. Owing to the low rainfall the grazing season is normally short, yet an average daily yield of 2¼ gallons is quite common. Output, moreover, is consistent throughout the year.

The system at Woodchurch Farm, Westgate, is typical of dairying in this corner of England. Mr. E. G. Quested there maintains a pedigree Guernsey herd of 35 milkers on 30 acres of grass out of a total farm area of 300 acres. His neighbour, Mr. Cyril Watson, has 27 milkers on six acres of grass—herbage that can be grazed only in May and June. Mr. Quested keeps the plough going all the time. Broccoli, the chief crop, is followed by fodder crops, barley and oats. Such an intensive system calls for a heavy supply of farmyard manure. The fodder crops consist of mangolds, kale and cabbage, which are fed winter and summer on the basis of carefully kept milk records. Tares, lucerne and clover leys provide the hay. Heifers due to calve in winter spend the summer on the Thanet marshes.

This limited dependence on grass for milk production demonstrates the value of the plough to dairy farming in districts where conditions are more favourable.

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Taking Care of the Nation's Milk

Losses Through Souring Must be Prevented.—It will be poor consolation to the housewife if she is told this summer that the farmer increased his milk production, but the extra quantity of milk produced went sour in transit. The vital importance of milk to the nation must be impressed on everybody engaged in its production and distribution. Sourages due to neglect are a reflection on the whole milk industry. It may present an immediate problem.

How can they be avoided? By grooming cows before milking and in the milking itself; by the very simple precautions of clean hands and " dry-hand " milking and by using clean and sterilised utensils. On farms not fitted with a sterilising plant the copper can easily be adapted. Mere scalding with hot water, however, is not sufficient. All utensils must be put in boiling water for at least two minutes.

Milk cooling is essential, and in the absence of a surface cooler, churns of milk should be placed in a tank or trough of water on

the north side of a building. There they should remain until they leave the farm. If road side collection is involved the waiting time on the road must be reduced to a minimum and some form of shade provided.

Milk in Sun and Shade.—A demonstration at Beesbury, Lincoln, indicated how the keeping quality of milk awaiting collection may be affected by placing churns in the sun, as against leaving them in the shade. Two milk churns were filled with water, one was placed in the sun and the other received improvised shade. The churn in the sun showed a temperature of 90° F., the one in the shade 60° F., a very considerable difference and one more than sufficient to change fresh milk into sour.

Fuel Saving in the Dairy.—By lighting the sterilising boiler fire before the evening milking all milk utensils can be sterilised twice with one lot of boiling water. Vessels which were washed after the morning milking are steamed ready for the afternoon milking and used immediately. After the milking they are washed and sterilised at once. In this way all utensils are kept properly clean and much fuel is saved.

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Milk, directly it leaves the cow, is subjected to the Fifth Column methods of *Streptococcus lactis*, the world's secret souring agent.

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Be on guard at all weak spots in clean milk defence. Constant supervision must be maintained along the line of communication between the cow and consumer.

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The chain of cleanliness is the cow, the milking shed, the milker (or milking machine) and all utensils used.

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Washing applies to the cow, cow-shed and milker. Proper cleaning and efficient sterilising safeguards utensils. Remember, milk must be cooled, well cooled—and kept cool.

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Warm weather means an "alert" in milk production, but sour milk is avoidable if:—

1. Cows are healthy.
2. Udders are washed before each milking.
3. Milkers are clean themselves and in their methods.
4. Sheds are clean and free from dust, hay and straw.
5. All utensils are *properly* cleaned and *efficiently* sterilised after each milking.
6. Straining cloths are boiled after each milking.
7. The milk is quickly and *well cooled.*
8. The milk is kept in a cool, shady place.

These are the minimum requirements for production of milk for human consumption, and do not entail unreasonable expenditure of money or labour.

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Economy Farm

Stock Fed from the Land.—Milk at Sacrewell Lodge Farm, Peterborough, is produced from a recorded and tuberculin tested herd of some 60 to 65 Shorthorns and Jerseys. This dairy herd, owned by Mr. W. S. Abbott, is now almost independent of purchased concentrates, thanks to the excellence of the temporary grass and the large quantity of silage made. Last year about 200 tons of grass, grass and clover, or lucerne were ensiled.

The silage was made in clamps and showed no trace of wastage. It is fed to all stock. About 40 lb. per head daily, with 10 lb. of hay, provides the dairy cows with their "maintenance" and the first gallon of milk. The "production" ration is made up of two parts oats, two parts beet pulp and one part decorticated groundnut meal. All heifer calves are reared and after their early life are brought up cheaply on hay, straw and silage. There is no breeding flock of sheep; lambs are bought in the autumn and used to eat up the sugar beet tops. With these, plus a little hay, they are successfully fattened.

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STATE VETERINARY SERVICE: A SCOTTISH VIEW

"Though Scottish farmers have not yet adopted* the contract system for regular veterinary inspection of their cattle herds for the four diseases which the National Veterinary Medical Association have set out to control—mastitis, abortion, sterility and Johne's diseases—there is every evidence that we are moving fairly rapidly these days towards a State veterinary service," observes *The Farming News and North British Agriculturist*, and continues: "Upon what evidence do we found these views or forecasts? If we confine ourselves to Scotland, and if we thus ignore for the time being the present voluntary movement in England and Wales for regular herd inspections upon the contract system evolved by the National Veterinary Medical Association, we are to-day confronted with several concurrent but unconnected developments. In the first place we have a recent significant change of title for the Ministry of Agriculture's all-British veterinary regime. Instead of merely being concerned with the control of scheduled diseases, this branch of the Ministry (the only one which has any direct jurisdiction in Scotland) is now called the 'Animal Health Division.' There is, as we say, much significance in this change of title. It denotes that the Division aims not merely at taking notice only when the scheduled diseases occur but at developing a system of preserving the general health of our herds, flocks and studs rather than delaying action till an emergency arises. That outlook denotes that prevention rather than cure, to use the old phrase, is the ultimate aim of the veterinary staff of the Ministry.

"If we seek evidence in Scotland of any immediate signs of this change of outlook on the part of the Ministry's division the most definite action, so far, is the decision to enter upon an animals health survey of the South-West area of Scotland. We understand that this survey has already begun and that the intention may be to extend similar surveys to other areas in turn. The purpose is to study the incidence, seasonal and otherwise, of diseases among farm stocks. If we take the South-West area as an example, it may be presumed that among the large dairy herds of that area the survey will find abundant scope for studying the prevalence of mastitis in its various forms, as well as the incidence of the other cattle diseases which are grouped together by the V.M.A.'s scheme south of the Border. . . . .

"Alongside this change of outlook on the part of the Ministry of Agriculture's veterinary staff we have (1) the movement under which the Department of Agriculture are placing a veterinary investigation officer under the wing of each of the Agricultural Colleges, and (2) the new system under which a number of veterinary practitioners in outlying parts of the mainland and the western isles are now being subsidised so as to enable them to pay periodic visits to specified areas in the interests mainly of smallholders and crofters. While all of these moves are to be commended, there will soon be need for some co-ordination of effort if each section of activity is to be made aware of the other's lessons and if there are to be no overlapping of services or gaps in the march of progress. There is already in being, we gather, a Scottish Research Board in veterinary science, but the co-ordination of the new armies of workers in the practical field is not one of its functions.

"When this problem of co-ordination is being faced, it is certain that we shall have to decide the big question of whether it is still expedient to continue the Ministry of Agriculture's jurisdiction over Scotland in the sphere of control of animal diseases. The fact that the Ministry has changed the title of its division to 'animal health' itself invites re-examination of its spheres of action. So long as the Ministry's staff were confining themselves to what we may call the 'fire-brigade' methods of dealing with flare-up diseases, such as foot-and-mouth and swine fever, there was really no valid argument against continuing the system of an all-British control centred upon London. Rather the reverse, we should say. Now that the Ministry's veterinary staff are spreading their wings beyond disease-control emergencies, the whole question arises as to whether the principle of Scottish home rule in agricultural administration does not demand that all our veterinary services should be controlled from St. Andrew's House. So long as slaughter is the recognised and sole method of stamping out foot-and-mouth disease we confess that all-British control of this highly-infectious malady appears the most effective policy. We need only recall the 1931 emergency, when a single Irish cattle shipment plunged both England and Scotland simultaneously into one of the most dangerous emergencies that has ever been experienced. Apart from foot-and-mouth, however, it is difficult to justify a separate control for any single service dealing with Scottish agriculture."

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CATTLE WARRANTY PREDICTED

"I do not think it will be long before you see all cattle sold under a warranty. When that happens there will be less disease."

The Farmers' Weekly quotes Major Mattinson, veterinary surgeon, Bamber Bridge, as making these predictions, at one of a series of milk-production demonstrations under the auspices of Lancashire W.A.E.C., and proceeds, "Major Mattinson said that what was going on at the moment was that somebody got rid of a cow he did not want and bought in return an animal someone else was getting rid of. So long as that went on one could not get rid of disease. 'Except at pedigree sales,' he continued, 'no one would dream of buying or selling a cow that was not bagged up. No vendor would dream of selling a cow with an empty bag and giving a warranty that she had given seven gallons

* See, however, note *re* completion of negotiations, p. 344.

a day for a week or so.' Cows were bought and sold on appearance, and there were few things more deceptive. Many farmers who bought a cow with an apparently good bag wished afterwards that they had had her stripped out first. It was a ridiculous system and a curious custom.

"Major Mattinson also spoke of overstocking. In this and in other dairying counties there were too many cattle on the farms. He was not in favour of understocking, but overstocking was worse. It simply meant that the stock was kept by the miller and not by the farm. There was neither the land nor the buildings sufficient for the creation of hygienic conditions necessary for the maintenance of a healthy herd. Even where dairying was second to stock rearing there were often too many young cattle reared to get the best results. He believed that the time was not far distant when we should see many changes in the environment of cattle and in the methods of management. Farmers would see their stock got more air and exercise, that they ate less and gave less milk. The best proposition for a farmer was the cow that gave a steady 650 or 700 gallons.

"'Many cows,' Major Mattinson remarked, 'are merely cargo.' He had told many a farmer who had complained when he had only been allowed a few shillings for an old screw that he would be in pocket if he gave someone £20 to take it away from his place. There were thousands of cattle that should be culled. He considered it a pity that the Ministry of Food did not pay more for this class of cow and less for the super-grade heifer that ought to be kept to produce milk."

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LEGAL NOTES

Milk Deficiencies: Effects of Breed and War-time Feeding.—An interesting judgment was given in Ayr Sheriff Court on Friday, July 24th, by Sheriff Wm. Garrett in a milk deficiency case. The case was one in which Peter Wilson, Guiltreehill, Kirkmichael, partner of Wilson Brothers, farmers, Guiltreehill, Kirkmichael, was charged with having on April 16th, at the Creamery, Kirkmichael, occupied by the United Creameries (Ltd.), Trowbridge, Wiltshire, sold by the firm to the United Creameries (Ltd.), and the Scottish Milk Marketing Board, 80 gallons of milk which contained less than 8·5 per cent. of milk solids other than fat, and that the milk was not genuine, contrary to the Sale of Milk Regulation and the Food and Drugs (Adulteration) Act. The Sheriff, after hearing evidence, imposed a fine of £4.

The Scottish Farmer records that the Sheriff, in giving his judgment, quoted the Lord President as having stated on one occasion that this class of prosecution "often results in hard cases owing to the artificial character of the statutory standard." He pointed out that a charge of selling milk below the presumptive standard is not a charge of fraud. The question is not whether the accused person has tampered with the milk, but whether the milk has been tampered with. It might, of course, have been tampered with either wilfully or accidentally without the accused person's knowledge. In this case, apparently, the farmer and his various assistants were all able to give evidence that they had not tampered with the milk, but the Sheriff did not consider that the evidence was sufficiently specific to exclude the possibility of additional water getting into the milk at some point. One of the witnesses admitted frankly in cross-examination "that it was possible that water had got in, but he never noticed any." The interest in the case, however, lay in the two main lines of defence put forward on behalf of the milk producer. One was that the deficiency, which amounted to 4 per cent. (the contents of solids-not-fat being 8·15 per cent., against the statutory minimum of 8·5 per cent.), might have been due to the breed of the cows; and the other, that the deficiency might have been due to war-time feeding. These were based largely on a monograph by Dr. W. L. Davies, on The Chemistry of Milk, published three years ago.

The milk concerned in this case was produced from British Friesian cows, and Dr. Davies had quoted the results of tests made to ascertain the composition of milk from different herds of cattle, which showed that Friesians were lowest in solids-not-fat with 8·48 per cent., or 0·02 below the legal standard. He had also quoted tests on a herd of Friesians in which over 80 per cent. of 1,226 samples taken during the winter were below the legal 8·5 per cent. The Sheriff took the view that the accused had established by his own evidence, by that of a veterinary surgeon, and by Dr. Davies's book, that breed did affect the composition of milk and that a Friesian herd on the average might produce milk slightly below the standard required by the statutory minimum on winter feeding; but he was not convinced that such a deficiency would be as great as 4 per cent. As to the effects of war-time feeding, the accused had said that the effect of poor feeding would probably be to reduce yield, but he was unable to express any opinion as regards solids-not-fat. The veterinary surgeon agreed that feeding would affect the quantity rather than the quality of the milk, and was of opinion that a stage would be reached when a percentage of non-fatty solids would show a decrease, but there was no evidence as to how great a decrease might be expected. Dr. Davies's opinion was that whilst under-feeding might depress the yield of the cows, it had very little effect on the composition of the milk, especially as to solids-not-fat. The Sheriff recalled that in a recent case he had decided that a comparatively trifling deficiency of 1 per cent. might reasonably have been attributed to feeding difficulties, but the 4 per cent. deficiency in this case was very considerable. It might have been the outcome of a combination of the Friesian breed and low-grade feeding-stuffs, but he pointed out that it was from a herd of 56 cows and from 80 gallons of milk, and under the circumstances he would have expected the evidence to be adduced to satisfy him that the April feeding would have accounted for it. This had not been done. Further, in this case the accused had not taken advantage of the "appeal to the cow" provided for under the 1928 Act. In finding the farmer guilty, the Sheriff admitted that the case was a narrow one and said it turned on the question of discharge of the onus of proof.

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The town M.P.s are finding out about agriculture—through interest and common sense. It is a good sign and a hopeful portent for our industry's future. We must see that it isn't allowed to flag. —*Farmers' Weekly.*

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The Ministry of Food announces that the samples of dehydrated meat which were recently sent to one hundred catering establishments throughout the country, ranging from London and provincial hotels to industrial canteens and coffee shops, have proved very satisfactory.

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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CONTROL OF DISEASES OF DAIRY CATTLE

Sir,—During the past two months several letters have appeared in these columns criticising the Survey Scheme. Such destructive criticism is to be deprecated as both disloyal and ill-timed. We had over two years in which to discuss this scheme—surely ample time for all critics to air their views. It was discussed by all divisions of the N.V.M.A., the vast majority of which declared in favour of it, and now the scheme has been launched, it is our duty to make every endeavour to ensure its success. Opposition now can have only harmful effects on the efforts of those of us who are doing our best, and to these destructive critics I would say "The remedy is in your own hands; there is no compulsion, and if you don't like the scheme, have nothing to do with it, but please refrain from trying to undermine the confidence of the fellows who are doing their utmost to make it a success."

Exception has been taken to the fact that the scheme produced no startling revelations in the matter of suggested lines of treatment. This is quite true, and these methods have in fact been practised by many practitioners for a number of years. The Survey Committee did not set out to produce new methods, its aim was simply to co-ordinate existing knowledge and individual prowess in order that the profession should make a wholehearted effort to reduce the enormous losses which are caused by these diseases.

The aim of its propaganda—perhaps somewhat enthusiastically worded—was to overcome a state of inertia in many stockowners, and to make them conscious of the possibilities of systematic control of disease. The recommendations have in this sense been a revelation to many farmers. Prevention and control of disease has not in the past been sufficiently impressed on the minds of farmers. They have become too used to thinking in terms of individual animals, and ali too frequently we meet the man who sends for us in a great hurry to attend a cow with a torn teat, but who remains quite complacent whilst the less spectacular chronic mastitis spreads rapidly through his herd.

Some members feel that the response to the scheme has been poor, and urge that to succeed it must be made compulsory. To

my mind a modest start is an advantage, in that we have the time to tackle these herds thoroughly and efficiently. To make the scheme compulsory would be to invite disaster. There are not nearly enough veterinarians to operate in half the herds in this country, and we could not hope to give an efficient service under such conditions. Complete Government control would mean the setting up of cumbersome machinery, with a superabundance of forms, and this alone would provoke vigorous opposition from the farmers.

Remuneration will always be a controversial subject, and admittedly there will be many instances where the pay for the services rendered will be poor. The fees were agreed upon some time ago, and since then expenses have increased considerably, but no useful purpose will be served by bemoaning this now. It is up to us to make a success of the scheme, and if our achievements warrant it, we shall be in a position to demand increased fees when the time comes for reviewing the working of the scheme.

This scheme is being run largely as a war effort, to help tide over the exigencies of the present position, and it is our duty to look upon it as a form of national service rather than question what financial gain we are likely to get out of it.

Let us then refrain from adverse criticism for the time being, and after, say, a year, we can voice our opinions in the knowledge that we have made an honest and conscientious effort to make the scheme a success.

Yours faithfully,

49, Cambridge Street, R. R. Bugg.
Aylesbury.
August 8th, 1942.

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The Cornish Resolution *re* the Survey Scheme

Sir,—The enquiries in my letter of July 18th *re* the resolution passed by the "Cornish Section" were naturally addressed to those who framed and adopted it, but Mr. Motton, in your issue of the 1st inst., withholds replies to them for some unstated reason connected with a pending meeting of the Western Counties Division. Instead, Mr. Motton's letter mainly consists of a castigation of supposed sins of the lay and professional Press, and I trust I may be pardoned if I fail to see how all this, and the pretty imagery of the boy with his ill-fated balloon, are relevant to the simple questions asked. However, Mr. Motton does throw some light upon the first of these, namely, in what ways "the existing veterinary service" in Cornwall came to be considered there to be already adequate to deal with problems seeming so difficult and menacing to many of us elsewhere. For I am assured that "long before the Survey Scheme came into sight," they in Cornwall knew all about its methods and recommendations. Therefore—since they passed this resolution—we must conclude that they did so, either because they rejected these methods, or because the provisions of the scheme or something better, were already being fully practised in the county. Further, and by contrast, we are told rather inelegantly and perhaps a trifle offensively, that others of our colleagues stood "open-mouthed" at supposed "revelations" which were already an open book to those acquainted with current literature. One is tempted to ask whether it is not possible that these colleagues envisaged as standing "agape" were in reality only "open-minded" and receptive. Perhaps we may also ask who these were who stood "agape," or "open-minded"—just a difference of point of view—and also whether they were such a relatively small and unimportant number? Well, the Survey Committee itself consisted of men engaged in all branches of the profession and from many parts of the country who are eminent in veterinary research, experience and general practice. Then, in collaboration with them, we note the names of many experts in the allied sciences, members of the Agricultural Research Council, the Ministry of Health, and officers of the Ministry of Agriculture, all sharing in the deliberations of the Committee and watching over the birth of the scheme until, after protracted study and many growing pains, it so appealed to the Animal Health Division that it was adopted as its own child. Again, and long before that happened, we must recall that it was exhaustively discussed by the rank and file of the profession in every Division of the N.V.M.A., and that the great majority of these passed resolutions in support of the scheme. Concurrently it was studied by the organised bodies which represent the vast agricultural interests it seeks to serve, and here again support was given, and trial of the greatest experiment yet attempted in the progress of animal health was approved. In all, one may consider, quite a goodly company to travel with, and upon a goodly adventure not rashly entered on, which if it may not "command success" may well "deserve it." Mr. Motton's letter gives no information regarding my second query as to how "the type of farming practised in Cornwall renders the operation of the scheme unnecessary there," but some constructive details on this ought to be of wide interest.

Yours faithfully,

Prestatyn, E. P. Edwards.
N. Wales.
August 7th, 1942.

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THE REMOVAL OF THE FOETAL MEMBRANES FROM CATTLE AFTER CALVING

Sir,—Letters to *The Veterinary Record*, from Mr. Motton and Mr. Shirley, *re* the trouble and cost of the removal of the foetal membranes from cattle when they have been retained after calving, prompt me to write you, that I find retained membranes are usually easily and safely passed, about 24 hours after an injection of 5 c.c. "Collosol Manganese" into the dewlap. Recovery is rapid and there is less risk of septicaemia than with manual removal. The cost is infinitesimal. Other animals also respond to similar treatment: last month a goat with two dead kids passed hers in twelve hours; I gave her 2 c.c. She is now giving six pints of milk daily.

Yours faithfully,

Parkstone, J. Stewart Wood.
Dorset.
August 8th, 1942.

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RECONSTRUCTION AND THE LAND

Sir,—I read the recent review of Sir Daniel Hall's book with much interest. It seems to me that it crystallises conclusions to which some of us familiar with agricultural conditions have been forced, however unwillingly. The crux of the matter is, I think, this familiarity with farming trends and opinions. It is surprising the number of one's clients who, unprompted, express themselves in favour of some replacement of incompetent or penurious landlords. It is, I suppose, too much to hope that Dr. McCunn, after nearly twenty apolaustic years (not, Mr. Editor, "apostolic": that has been for others) should emerge into the twentieth century (*vide* his recent publicly expressed condemnation of research into artificial insemination on the grounds that it is "un-English"); but if he could only emerge from the eighteenth to the nineteenth century, and note the general trend of political and economical evolution, one would perhaps find his contributions to current thought of more value. Nothing, except perhaps Dr. McCunn, is static; we have unfortunately to fit ourselves into changing circumstances. If we, or even an active minority of us, are awake to changing conditions, there is some hope that we may be able to mould them to our own conception. Otherwise we are inevitably doomed to compulsory absorption into a rigid system of State service. The medical profession is faced with an analogous situation; let us hope the shorter-sighted in our own profession will not land us in the same boat.

Yours faithfully,

Chipping Norton, Paul Crosfield.
Oxon.
August, 1942.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV)

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Parasitic Mange*	Sheep Scab	Swine Fever
July 1st to 15th, 1942	16	29	—	1	15
Corresponding period in—					
1941 ...	8	2	—	3	29
1940 ...	15	—	1	2	221
1939 ...	29	—	—	4	149
Total Jan. 1st to July 15, 1942	188	74	26	118	247
Corresponding period in—					
1941 ...	282	257	10	137	824
1940 ...	296	19	15	117	2,332
1939 ...	481	44	31	156	1,200

Note.—The figures for the current year are approximate only.
* Excluding outbreaks in Army Horses.